



Field Guide 2026



Welcome to the 6th Annual Detroit SonoW.A.R.!

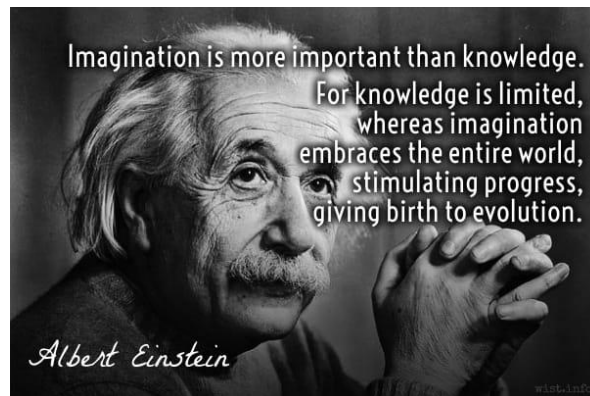
This isn't your typical ultrasound course — and it's not meant to be. Today isn't about reviewing the basics. It's about shaking up what you thought you knew, exploring the edges of ultrasound application, and sparking innovative thinking in emergency medicine.

Today you will be faced with creative challenges that reflect how point-of-care ultrasound (POCUS) is revolutionizing clinical decision-making across disciplines. Expect to encounter uses of ultrasound you've never imagined. The problems you'll face in your medical career won't come with easy answers, so why should your training?

This is your chance to stretch, rethink, and reshape the possibilities. Step outside your comfort zone and help shape the future of medicine.

We're honored to welcome an extraordinary lineup of faculty from across the country who bring passion, expertise, and a shared belief in pushing the boundaries of what's possible.

By the end of today, we hope your legs are tired, your brain is buzzing, and your curiosity is reignited with new ideas in both Wilderness and Advanced Emergency Medicine
Ultrasound.



Let's get to work!



Rules: 10 x 10 x 10

1. There are 10 stations scattered around the island
2. Each station is worth 10 points and combines elements of Detroit/Michigan history, Advanced Emergency Medicine Ultrasound, and Wilderness Medicine
3. Each station will have a 10 minute time limit
 - a. The stations are open book – use your navigation time between stations wisely to arrive prepared!
4. Scatter Start: Each team will be assigned a random Station to start (to avoid clumping)
 - a. You must use strategy, teamwork, and navigational skills to decide from there
 - b. You are not expected to do the stations in numerical order – you are the captain of your own ship! Forge your own path to victory!
5. All stations will open precisely at 9am
 - a. You may want to be waiting at the station come 9am so you have as much time for all stations as possible!

Additional Details:

6. The event will end at 12 noon sharp and scores will be tallied and announced at 1p
7. Most importantly, HAVE FUN! Gentle smack talk is allowed, but remember we are all on the front lines together. EM is a tight-knit family... so if a competitor dies of exhaustion, *consider* stopping to help. See you at the finish line!



(Interactive Google Earth Map)



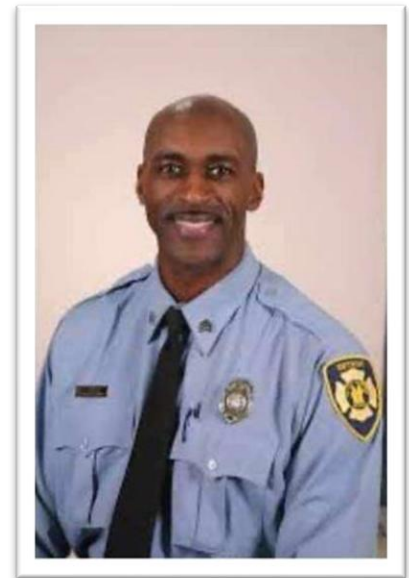
Let us take a moment to remember a fallen hero, Detroit Fire Sgt. Sivad Johnson, who died in 2020 while helping save 3 girls from drowning at Belle Isle. Per The Detroit News,

"The 26-year veteran of the department and his daughter were walking near the Yacht Club when they heard three young girls screaming for help from the water, Fornell told The Detroit News.

"He's a firefighter, he saw the girls in distress and jumped in. He's done that his entire career," Fornell said. "Something happened, and it's unfortunate to have lost one of our own that way." ...

"It is believed [Johnson] may have been dragged underwater by the rip-current and no one noticed," Michigan State Police said."

"Johnson was a 26-year veteran of the Detroit Fire Department's Fire Engine 59 and a recipient of the 2017 Medal of Valor. "He was my idol," said Jamal Johnson, Sgt. Sivad Johnson's brother. "He was always a hero to me." Sgt. Johnson always wanted to help others and he died doing just that."



References

Detroit News, Aug 21 2020 <https://www.detroitnews.com/story/news/local/detroit-city/2020/08/21/search-underway-man-reported-missing-detroits-belle-isle/3417039001/>



References to ruminare on, en-route to this station

1. Cohen, A. *Femoral artery Doppler ultrasound is more accurate than manual palpation for pulse detection in cardiac arrest*. Resuscitation, 2022.



2. Rolston, D. *Time is running out for manual pulse checks as ultrasound races past*. Resuscitation, 2022. [https://www.resuscitationjournal.com/article/S0300-9572\(22\)00622-0/fulltext](https://www.resuscitationjournal.com/article/S0300-9572(22)00622-0/fulltext)
3. Rabjohns, J et al. *Pesudo-pulseless electrical activity in the emergency department, an evidence based approach*. The American Journal of Emergency Medicine, 2020. <https://www.sciencedirect.com/science/article/abs/pii/S0735675719306527?via%3Dihub>
4. Koch, M et al. *Carotid Artery Ultrasound in the (peri-) Arrest Setting – A Prospective Pilot Study*. Journal of Clinical Medicine, 2022.
5. Adedipe, A et al. *Carotid Doppler blood flow measurement during cardiopulmonary resuscitation is feasible: a first in man study*. Resuscitation 2015.
6. Catena, E et al. *Association between left ventricular outflow tract opening and successful resuscitation after cardiac arrest*. Resuscitation, 2019.

Station 1: Resuscitation Station



(5-10mins) Board the Detroit Fire Boat and discuss a day in the life of the crew of the *Sivad Johnson*.
If we get a patient from them, what have they had to do to get that patient to us in the hospital?

- 1 Point Please describe to faculty at least three (3) things you learned from the crew of the *Sivad Johnson* about the Detroit Fire Boat and their challenges facing emergency scenarios on the water and pre-hospital patient care
- 1 Point Faculty will select the two teams that asked the *best* questions to get this extra point. What are the “best” questions? The ones deemed most insightful, provocative, or thoughtful; or the ones that generate interesting/unique answers from the crew

(≤10 mins) On shore, engage with faculty regarding POCUS guided resuscitation:

- 1 Point How accurate is a manual pulse check for determining pulselessness?
- 1 Point What is the difference between PEA and “pseudo”-PEA?
- 1 Point How can you tell the difference without ultrasound?
- 1 Point

[Redacted text]

Carotid doppler blood flow measurement is currently being researched as a means of guiding adequate CPR^{4,5}. In particular, the carotid **End Diastolic Velocity (EDV)** is proposed to be an important indicator, since adequate diastolic flow is required to ensure steady cerebral perfusion.⁴

- 1 Point What is a normal physiological **EDV**? (High quality CPR should try and match this!)
- 1 Point Measure the carotid **End Diastolic Velocity** on your teammate

Maybe there’s cardiac activity, but is there enough blood pressure? **Peak Systolic Velocity (PSV)** of the femoral artery has been shown to correlate with blood pressure in cardiac arrest. Specifically, a **PSV** ≥ 20 cm/s was more accurate than palpation to detect systolic blood pressure ≥ 60 mmHg.

- 1 Point Measure the femoral artery **PSV** on a teammate

(for SonoW.A.R. purposes please measure the femoral artery at the mid-thigh level for modesty and also because it’s more of a challenge!)
- 1 Point Complete this station within 10 minutes (time on Fire Boat does not count)

For almost 2 million years, the Great Lakes area of Michigan was intermittently covered by glaciers during a period called the Ice Age. Sea level dropped as much as 492 feet as water was locked in glacial ice and continental ice sheets covered as much as 30 percent of the earth's land surface. Nearly all of the landforms, hills, lakes, and rivers of southeast Michigan were formed during the retreat of the last continental glacier.



You and your team suddenly find yourselves at the top of one of these glaciers, towering thousands of feet above what would eventually become the top of the Detroit Renaissance Center. Some of you feel short of breath. Some have headaches.

References

1. Gifts of the Glaciers – www.oaklandcountyblog.com



References to ruminate on en route to this station:

1. Auerbach, P. Field Guide to Wilderness Medicine, 4th Ed. Chapter 1, High Altitude Medicine. Elsevier. 2013
2. Wipplinger, F, et al. *Point-of-Care Ultrasound Diagnosis of Acute High Altitude Illness: A Case Report*. Wilderness & Environmental Medicine, 2021
[https://www.wemjournal.org/article/S1080-6032\(21\)00003-X/fulltext](https://www.wemjournal.org/article/S1080-6032(21)00003-X/fulltext)
3. Yang W, et al. *Lung Ultrasound Is Accurate for the Diagnosis of High-Altitude Pulmonary Edema: A Prospective Study*. Canadian Respiratory Journal, 2018
4. Raffiz, M. *Optic nerve sheath diameter measurement: a means of detecting raised ICP in adult traumatic and non-traumatic neurosurgical patients*. Am J Emer Med, 2017
5. Copetti R and Cattarossi L. *Optic nerve ultrasound: artifacts and real images*. Intensive Care Medicine, 2009

Station 2: Elevation Station



1 Point At the peak of the last ice age (only ~20,000 years ago), how much ice would have been above your head right here on Belle Isle?

1 Point As you ascended the glacier, you noticed one of your teammates developing symptoms concerning for acute mountain sickness. Name 5 of the symptoms that are part of the Lake Louise Score for the diagnosis of AMS.

1 Point

1 Point What feature(s) distinguish acute mountain sickness from HACE? What is the definitive treatment for both?

1 Point Identify and demonstrate proper technique for assessing elevated intracranial pressure on POCUS

1 Point What is the most common pitfall when performing an ultrasound measurement for elevated intracranial pressure? How can one assure they are measuring the correct structure?

1 Point What other eye emergencies commonly occur at very high altitude?

Hypoxia triggers hypoxic pulmonary vasoconstriction, which leads to marked increase in pulmonary artery pressures (pulm HTN), leakage of fluid into alveoli, and non-cardiogenic pulmonary edema.

1 Point What echocardiography findings would you expect to see with HAPE? (Demonstrate on your teammate how you would assess with TAPSE)

1 Point

1 Point How do you treat HAPE?



Tick born illness is now becoming endemic to Michigan! This shift has changed the differential diagnosis landscape in emergency medicine. Patients with: fever, headache, myalgias, meningismus, cranial neuropathies, unexplained AV block, or summer “viral syndromes” **now increasingly warrant consideration of tick-borne illness.**

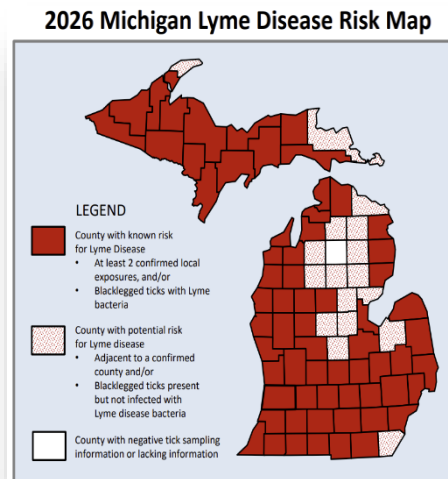
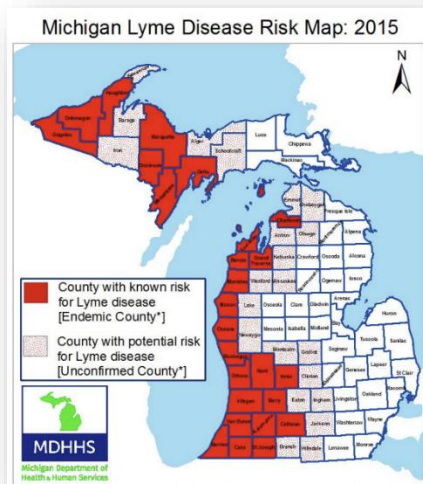


Per Michigan NPR, “Lyme disease cases in Michigan continue to rise, **quadrupling** from 553 in 2022 to 2,167 in 2025.

For the first time, the state is considered a “high-incidence jurisdiction” by the Centers for Disease Control and Prevention. “[Ticks] have been increasing in population across the Midwest for a few reasons. Ticks are very acclimated to Midwest climate. They reproduce in large numbers, and they survive our winters very well, and they like our hot, humid summers”. As the weather gets warmer, epidemiologists say the best way to protect against Lyme disease is to avoid tick bites.

“Our tick populations will continue to spread, and the best thing to try to prevent this increase in cases is preventing tick bites, and that comes down to the behavior and the prevention methods that our citizens here in Michigan are utilizing.”

Michiganders are encouraged to use an EPA-approved bug repellent, do tick checks on themselves and their pets after being outside, and stay on well-groomed trails when hiking.”



- <https://www.michigan.gov/emergingdiseases/home/lyme-disease>
- <https://www.michiganpublic.org/health/2026-04-20/michigan-lyme-disease-cases-nearly-quadrupled-between-2022-and-2025>

References to consider en route to this station

1. CDC, *Clinical Care and Treatment of Neurologic Lyme Disease*. Accessed online 2026, CDC.gov <https://www.cdc.gov/lyme/hcp/clinical-care/neurologic-lyme-disease.html>
2. Fazier, N and Douce, R. *First reported case of Lyme carditis in Southwest Michigan*. SMRJ, 2017. <https://smrj.scholasticahq.com/article/5933-first-reported-case-of-lyme-carditis-in-southwest-michigan>
3. Johns Hopkins Medicine Lyme Disease Research Center, *Lyme Disease Signs and Symptoms*. Accessed online 2026. <https://www.hopkinslyme.org/wp-content/uploads/2020/04/Maryland-DMHMH-Lyme-MD-poster-final.pdf>

This chart is not really a part of this station, but still is a really good reference. Look it up! ³



4. Crespo, M and Jones, R. *Techniques for Performing Paramedian Approach to Lumbar Puncture*. ACEPNow, 2017. <https://www.acepnow.com/article/techniques-performing-paramedian-approach-lumbar-puncture/>
5. Wagner, J et al. *Increased lumbar puncture success using a paramedian approach: A retrospective cohort study*. J Hosp Med, 2025. <https://pubmed.ncbi.nlm.nih.gov/40686417/>
6. Doat-Sarfati, V et al. *Fatal arachnoiditis following accidental intradural injection of chlorhexidine: a case report and literature review*. Reg Anesth Pain Med, 2026. <https://pubmed.ncbi.nlm.nih.gov/41781151/>

Station 3: Inoculation Station



You have several patients each presenting with **fever, myalgias, and headache**. They all probably just have a viral URI and should get some Toradol and discharge ... right?

For this station, your team must work together to identify a fourth sign or symptom that can differentiate some of the many conditions that could present with these vague symptoms of fever, myalgias, and headache. Make your diagnosis and then associate the proper treatment and inoculation vector!

0-6 Points Get one point for each entirely correct column. Must fully match Vector, Treatment, and board-style Diagnostic Clue to get a point!

	Condition 1	Condition 2	Condition 3	Condition 4	Condition 5	Condition 6
Vector:						
Dx:						
Tx:						

1 Point Now you must perform an ultrasound guided lumbar puncture to clinch a life-saving diagnosis. Which is the best antiseptic to use to prep the area and why?

1 Point



1 Point Demonstrate on your teammate what proper positioning for a landmark-based LP looks like, and for one point measure the change in size of the gap between spinous processes when your patient flexes their back “cat style” versus flat positioning

1 Point Demonstrate on the mannequin a successful ultrasound guided paramedian approach lumbar puncture

Station 4: Deresuscitation Station

During the 2009 Detroit Free Press / Flagstar Marathon, three men (ages 26, 36 and 65) died within minutes of each other near or at the finish line.

As the Detroit Free Press reported the next day:

“It had been a chilly, but buoyant morning. And then tragedy hit at 9:02 a.m.

That's when Daniel Langdon, 36, of Laingsburg collapsed on Michigan Avenue between the 11- and 12-mile markers ...

Fifteen minutes later, at 9:17 a.m, 65-year-old Rick Brown of Marietta, Ohio, collapsed near where Langdon went down...

And then Jon Fenlon, 26, of Waterford collapsed at about 9:18 a.m., just after finishing the half-marathon in 1:53:37.

Marathon doctors and race officials said rapid, state-of-the- art resuscitation was provided. There were 14 doctors on the team of more than 60 health workers, directed by an emergency physician from Detroit Receiving Hospital.”



<https://www.youtube.com/watch?v=Wi-b-AKUhPY>

STORY · Published January 14, 2015 1:20am EST

Autopsies for Three Who Died in Detroit Marathon Inconclusive

f t p i m

DETROIT – The deaths of three runners who collapsed during a 13.1-mile half marathon appear to have been an aberration, but at least six runners have died while competing in such events in the last two months.

Autopsies were inconclusive Monday on the bodies of Rick Brown, 65, of Marietta, Ohio; Daniel Langdon, 36, of Laingsburg in central Michigan; and Jonathan Fenlon, 26, of Waterford, northwest of Detroit. The Wayne County medical examiner has requested toxicology tests.

The three died Sunday during or after running a half marathon at the Detroit Free Press/Flagstar Bank Marathon. Brown and Langdon collapsed near the end of the race, and Fenlon died after crossing the finish line. Friends and family of the men said they had trained for the 13.1-mile race and were in great shape.

<https://www.foxnews.com/story/autopsies-for-three-who-died-in-detroit-marathon-inconclusive>

You find yourself as part of the team tasked with preparing medical care for this year’s Detroit Marathon, which takes place Saturday Oct 18^h 2026.



References and illuminating articles to consider taking a peek at en-route to this station:

1. Dayer, M et al. *Mortality during marathons: a narrative review of the literature*. British Medical Journal Open Sport and Exercise Medicine, 2019.
2. Bennett, B et al. *Wilderness Medical Society Clinical Practice Guidelines for the Management of Exercise-Associated Hyponatremia: 2019 Update*. Wilderness and Environmental Medicine, 2019.
3. Malbrain, M et al. *Everything you need to know about deresuscitation*. Intensive Care Medicine, 2022.
4. Zavorsky, G et al. *Pulmonary Edema is frequently triggered by marathon running*. European Respiratory Journal, 2012.
5. Hanson, M. *The Most Bizarre Marathon in Olympic History*. Outside Magazine. Website, accessed May 2023.
<https://www.outsideonline.com/health/running/culture-running/history/strange-running-history-the-1904-olympic-marathon/>
6. Beaubien-Souljiny W, et al. *Quantifying systemic congestion with Point-Of-Care ultrasound: development of the venous excess ultrasound grading system*. Ultrasound Journal, 2020
7. *The VExUS Score: Fluid Status, Reconsidered*. Florida College of Emergency Physicians. https://fcep.org/the-vexus-score-fluid-status-reconsidered/?utm_source=rss&utm_medium=rss&utm_campaign=the-vexus-score-fluid-status-reconsidered



Station 4: Deresuscitation Station



1 Point Medical resources are finite and generally limited at a large event such as a marathon. During which stage of a marathon do most deaths occur?

One author notes “Marathon running is linked to an increased risk of pulmonary edema, and it seems that women are at higher risk than men regardless of marathon finishing time.”³

1 Point The most common cause of death in marathon runners is due to intrinsic heart disease, predominantly in men over 40.¹ What is a more common cause of death in younger marathon runners?

1 Point The Wilderness Medical Society recommends avoidance of overhydration. How much should you drink during endurance exercise?

1 Point You encounter a marathon runner that is displaying moderate respiratory distress and altered mental status. How can you use POCUS to differentiate between dehydration, cardiogenic pulmonary edema (such as MI), and noncardiogenic pulmonary edema (such as from exercise induced hyponatremia)?

The term “**deresuscitation**” was coined in 2014 and defined as active fluid removal in patients with fluid overload.³ It has become recognized that both fluid administration and fluid removal have potential for both harm and benefit.

1 Point The VEXUS score uses POCUS to assess if there is vascular congestion (volume overload). [REDACTED] ?

Measure your teammate’s VEXUS score using POCUS

1 Point Assess IVC

1 Point Assess Hepatic Vein

1 Point Assess Portal Vein

1 Point Assess Renal Vein

1 Point Complete this entire station within 10 minutes

Your family is exploring the parks and wetlands around metro Detroit when your child screams out after feeling a sharp pain in their ankle just above the boot, and you see a snake slither away into the brush. They start to feel lightheaded. You take a picture of the snake.

You become concerned because you recall a fatal 2018 incident in Detroit where a 26yo male was bitten by a pet cobra and died, despite a multistate effort to scramble and administer 8 vials of antivenom.²

You were additionally concerned by a news story from 2019 where two Michigan residents were bitten by rattlesnakes in one month.³ Although neither died, one patient required a week of hospitalization and required use of a cane to walk for a prolonged time afterwards.



"All I felt was....my ankle was on fire," Bowen said. "It was just immediate. I took a couple steps and set down the stuff, and I turned around and it was a huge snake.

I kind of took a couple steps towards it and it rattled. But I wasn't sure because I'd never seen a rattlesnake before." ³

References

1. Michigan Department of Natural Resources www.michigan.gov/dnr
2. Zaniewski, A. *Bite from exotic snake sparks multistate scramble for antivenom.* Detroit Free Press, 2018.
3. Afana, D. Two Michigan residents bitten by rare rattlesnake in one month. M Live, 2019. https://www.mlive.com/news/ann-arbor/2018/09/pinckney_woman_bitten_by_rattl.html

Station 5: Pediatric Envenomation Station



Recommended readings and new ideas to discuss en route to this station:

1. Crotalidae Envenomation – StatPearls, 2021. <https://www.ncbi.nlm.nih.gov/books/NBK551615/>
2. Zhou A, et al. *Interobserver Agreement of Inferior Vena Cava Ultrasound Collapse Duration and Correlated Outcomes in Children with Dehydration*. Pediatric Emergency Care, 2022. <https://pubmed.ncbi.nlm.nih.gov/32530838/>
3. Leviter, J et al. *“Full Stomach” Despite the Wait: Point-of-Care Gastric Ultrasound at the Time of Procedural Sedation in the Pediatric Emergency Department*. Academic Emergency Medicine, 2019. <https://pubmed.ncbi.nlm.nih.gov/30372569/>

Station 5: Pediatric Envenomation Station



- 1 Point Navigate to this location and find the hidden snake
- 1 Point What is the only venomous snake native to Michigan?
- 1 Point ?
- 1 Point Which of the following are recommended for immediate management of snakebites:
Tourniquet to the limb; Sucking out venom; Cutting the wound to remove venom;
Immobilizing the limb to prevent lymphatic spread; Catching the snake / killing it to bring it in
for identification.
- 1 Point What are the main/significant differences between pit vipers, rattlesnakes, cottonmouths,
and copperheads?

Emergency management of shock and bleeding, followed by timely antivenom administration to patients with progressive tissue swelling or systemic toxicity after Crotalinae envenomation, are the most common actions needed when stabilizing patients with Crotalinae snakebites.

- 1 Point But when should you administer antivenom?? I.e., which physical exam findings or
laboratory values should alert you to “pull the trigger” to receive antivenom?

Hypovolemia from hemorrhage, fluid shift into the bitten limb, and/or direct venom effects with vasodilation may cause shock with hypotension.

Interesting recent studies have shown that in the pediatric ED population, eyeball assessment of the IVC collapse *time* may accurately reflect degrees of hypovolemia or dehydration.

- 1 Point The super cool volunteer child in front of you was bitten by a snake and you are assessing for
hypovolemia and vasodilation. What is their IVC collapse time? Based on this would you
administer IV fluids, PO fluids, or none?

Some populations of these snakes possess a neurotoxin that can produce weakness and respiratory failure. When there is time to consider airway options other than emergent RSI, a new and growing trend in anesthesia literature is the use of gastric POCUS to assess a patient’s aspiration risk.

- 1 Point EMS arrives to transport the child and decides to place an advanced airway. Should you use
mild sedation and an LMA or jump to RSI? The parents report last meal was pancakes about
6 hours ago. According to ACEP, what is the association between fasting time and
aspiration?
- 1 Point What are the four categories you should be looking for with Gastric POCUS?
- 1 Point Assess and stratify this patient’s gastric contents using point of care ultrasound

Station 6: International Space Station ... Station



“Ultrasound has been used in some remote areas where it is not feasible to have a clinician with specialized training present. The International Space Station (ISS) is probably the epitome of remote locations, and the National Aeronautics and Space Administration pioneered remote telemonitored ultrasound, which uses live video streaming of ultrasound examinations performed by nonmedical personnel and reviewed by clinicians in real-time on Earth.”¹



Dr. Koch



Water as coupling medium in microgravity



Dr. Cassada

To date there have been 33 NASA astronauts from the state of Michigan.³ Most recently, Michigan-born Dr. Christina Koch is a historic NASA astronaut and engineer who served as a Mission Specialist on the Artemis II mission to the Moon. She made history as the first woman ever to travel beyond low-Earth orbit and holds the record for the farthest distance any woman has traveled from Earth

Another Michigan born astronaut, Dr. Josh Cassada recently returned from the International Space Station and interestingly reports to the Detroit SonoW.A.R. that ultrasound in microgravity is unique in that gel is not required – water alone is sufficient as a coupling medium since it stays in place due to surface tension!

Ultrasound is the only medical imaging device currently available on board the International Space Station. In addition, the lack of routine physician expertise on board the ISS makes diagnosis of medical conditions challenging. **For this station, you will be taking the role of a land-based physician guiding a team of astronauts through an emergent medical situation on the ISS.**



References and interesting things to discuss en route to this station:

1. Gharahbaghian, L et al. *Point-of-Care Ultrasound in Austere Environments: A Complete Review of Its Utilization, Pitfalls, and Technique for Common Applications in Austere Settings*. Emergency Medicine Clinics of North America, 2017. <https://pubmed.ncbi.nlm.nih.gov/28411935/>
2. Johnson, M. *Bringing Space Station Ultrasound to the Ends of the Earth*. NASA.gov website, 2019. https://www.nasa.gov/mission_pages/station/research/news/b4h-3rd/hh-bringing-space-station-ultrasound
3. Michigan Astronauts. Website, accessed My 2023. <https://www.minspacegrant.org/connect/michigan-astronauts/>
4. Fu Q, et al. *Impact of Spaceflight on Blood Pressure*. Circulation, 2019. <https://www.ahajournals.org/doi/10.1161/CIRCULATIONAHA.119.041050>
5. Aunon-Chancellor, S et al. *Venous Thrombosis during Spaceflight*. New England Journal of Medicine, 2020. <https://www.nejm.org/doi/full/10.1056/NEJMc1905875>
6. Driver, et al. *Emergency Ultrasound diagnosis of internal jugular vein thrombosis*. Critical Ultrasound Journal, 2010. <https://theultrasoundjournal.springeropen.com/articles/10.1007/s13089-010-0046-z>
7. Simka, M et al. *Blood flow in the internal jugular veins during spaceflight – is it actually bidirectional?* Life sciences in Space Research, 2020.

Station 6: International Space Station ... Station



1 Point Navigate to this location and complete it within 10 minutes

One of the crewmembers on the ISS is noted to be hypotensive with BP 85/60.⁴ You must use telemedicine to talk the crew through a RUSH exam. Your team member performing the exam will not be able to see the screen, and must rely on their teammates to talk them through the image acquisition.

1 Point What can ultrasound identify that could be making this astronaut hypotensive? I.e, what are the components of the RUSH exam?

1 Point



1 Point Identify and assess the patient's IVC

1 Point Identify and assess the patient's RUQ / Morrison's pouch. What location is the most sensitive for free fluid in the abdomen?

1 Point Identify and assess the patient's aorta in long axis

1 Point Identify bilateral lung sliding at the midclavicular line using m-mode

A landmark case was noted in 2019 when an otherwise healthy astronaut who was 2 months into a mission aboard the International Space Station was noted to have an obstructive L internal jugular venous thrombus.

1 Point Using telemedicine guidance, scan your patient's Left IJ as part of the now routine vascular check aboard the ISS

1 Point The Mueller maneuver (opposite of Valsalva) is important in microgravity to augment intrathoracic pressure. Predict and demonstrate with the effect of the Mueller maneuver will have on your IJ

1 Point Describe 3 ways one can confirm the presence of thrombosis using POCUS

Station 7: Tactical Extrication Station



Metro Detroit has seen 60-year low numbers of violent crimes and gun violence in recent years, with the first three quarters of 2025 seeing the number continue to plummet below even the record low numbers achieved in 2024.¹

This has been attributed to ongoing partnerships between local and state law enforcement, community groups, and a recent surge in federal enforcement and prosecutions. Through September 30, 2025, Detroit has seen double-digit drops in homicides, nonfatal shootings and carjackings compared to the same point last year.

In 2024, Detroit finished the year with the fewest homicides on record since 1965. The city also is seeing even steep reductions in nonfatal shootings and carjackings.



However, despite these local gains, mass shootings nationwide have been steadily escalating at an alarming rate. They have been consistently on the rise, with an alarming all-time high of 36 shootings in the period from 2015-2019.

The U.S. accounts for around a third of the world's mass shooters despite representing just 5% of the global population. 73% of all mass shootings in developed countries occur in the U.S.²

For this station, you will interact with members of the Macomb County SWAT Team to gain insight into some elements of Tactical Medicine and the challenges of pre-hospital emergency care in an austere environment.

Sources:

1. City of Detroit, <https://detroitmi.gov/news/3rd-quarter-numbers-show-2025-violent-crime-detroit-dropping-far-beyond-historic-2024-results>
2. The Violence Project <https://www.theviolenceproject.org/key-findings/>

Station 7: Tactical Extrication Station



References to consider en route to this station:

1. Boivin, Z and Stenberg, R. *Cardiac Tamponade*, ACEP Emergency Ultrasound Section. Accessed online 2026.
<https://www.acep.org/emultrasound/newsroom/may-2024/cardiac-tamponade>
2. Assaf, M et al. *Pericardial Tamponade in Trauma: A Systematic Review of Diagnosis, Emergency Management, and Surgical Outcomes*. Cureus, Sept 2025.
<https://pmc.ncbi.nlm.nih.gov/articles/PMC12510441/>
3. Alerhand, S et al. *Pericardial tamponade: A comprehensive emergency medicine and echocardiography review*. Am J Emerg Med, 2022.
<https://pubmed.ncbi.nlm.nih.gov/35696801/>
4. Goldstein, S et al. *EMS Zones of Care*. StatPearls, 2025.
<https://www.ncbi.nlm.nih.gov/books/NBK436017/>

Station 7: Tactical Extrication Station



You must pick one teammate to don tactical gear. Then, in this scenario, we will pretend that teammate gets hit with a gunshot wound to the chest. While doing so...

1 Point Please spend a couple minutes engaging with the Macomb County SWAT team to gain their insight into *tactical medicine* and what a day in their life is like providing emergency services under fire. To get 1 point, will need to describe to faculty at least three (3) things you learned from the Macomb County SWAT team and their experiences.

1 Point First and foremost, if you are ever involved in a real active shooter event, what is the first rule about scene safety?

1 Point What does SWAT stand for?

1 Point In this scenario, there is an active shooter in the Historic Casino Building and several civilians are injured inside. What do the terms “hot zone, warm zone, and cold zone” refer to, and give an example of what those might be right here.

1 Point

[Redacted text]

1 Point You have safely made it behind the SWAT vehicle and are reinforced by sniper cover. You have access to a POCUS device while awaiting evacuation. You notice your teammate has a GSW to the epigastric area and turns pale, and you are barely able to appreciate a thready pulse.

Describe how you could use POCUS to quickly differentiate between two very different and immediately life threatening conditions: hemorrhagic shock and pericardial tamponade.

(Bonus point: What *one structure* easily visible by POCUS appears very different in these two conditions?)

Station 7: Tactical Extrication Station



- 1 Point You identify a pericardial effusion. It has come to my attention that some residents are still graduating without knowing how to tell the difference between an effusion and an effusion with tamponade. Demonstrate 3 ways to diagnose *cardiac tamponade physiology* using POCUS (other than just “unstable vital signs”).
- 1 Point You identified tamponade. Your teammate loses pulses. What should you do first?
- 1 Point Demonstrate on your teammate where you would perform an emergent ultrasound-guided pericardiocentesis. *But wait – isn't pericardiocentesis controversial in trauma? Aren't there just clots? Or if not, aren't you just bloodletting?* Describe how much fluid you should remove and why.
- 1 Point Bonus Point: SonoW.A.R. Faculty and Macomb SWAT members will select the three teams that asked the *best* questions at the beginning to get this extra point.
- What are the “best” questions?* The ones deemed most insightful, provocative, or thoughtful; or the ones that generate interesting/unique answers from the team.

1,200 feet under Detroit is a huge, giant, insanely big salt mine. The mine sprawls across 1,500 acres and contains more than 100 miles of road.

In 1895, this large vein of rock salt was discovered in the Detroit area. In 1910, the Detroit Salt Company completed a 1,060-foot shaft that was one of the most impressive engineering accomplishments of its time.¹

Your party is exploring the historic mines. While exploring, you become separated from your group and your arm gets stuck under a large boulder of Detroit salt. You have no choice but to cut your own arm off in a desperate bid for freedom.

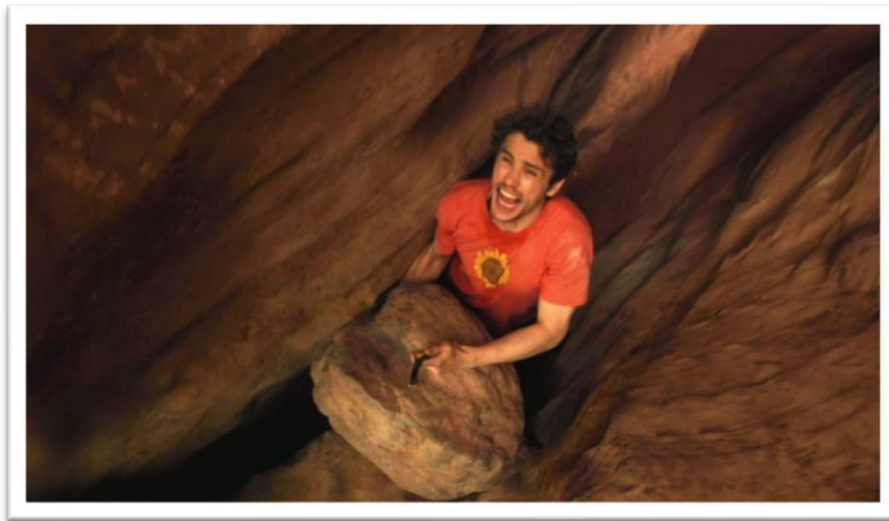


Photo credit: <https://www.digitaltrends.com/movies/127-hours-review/>

References

1. Detroit Salt Mine – History of the Detroit Salt Mine www.detroitsalt.com/history

Station 8: Innervation Station



Rotate scanners for each point. Identify with ultrasound on a teammate:

- 1 Point Where you would block the three forearm nerves
- 1 Point Where you would block the three roots of an Interscalene block
- 1 Point Where you would block the three cords for a RAPTIR block

- 1 Point (Must match all 3 right) Which nerve block would you perform for:
- 1 Point What medication and dose (volume) is safe and effective for each of the above blocks?
- 1 Point Special echogenic needles are provided for this station courtesy of Pajunk. If you were in a resource-limited setting, however, what type of needle could you use for almost any nerve block?

Your teammates find you and are able to help extricate you from the boulder. However, you find that pain in your leg is keeping you from being able to ambulate out of the mine. Damn sciatica!

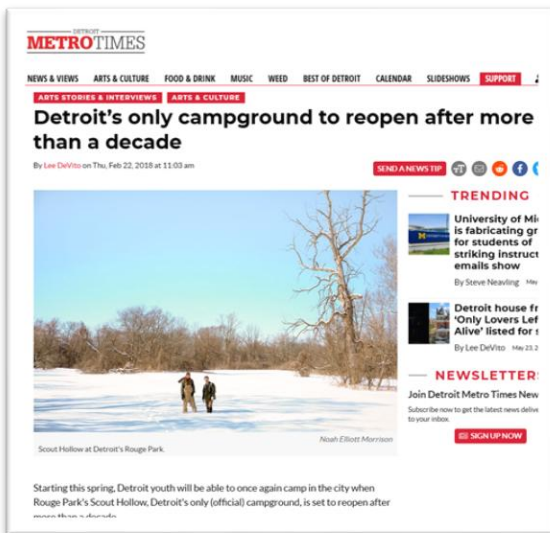
Did you know that some physicians are using *sugar water*, not lidocaine, to treat compressive radiculopathies like carpal tunnel? Or even sciatica in the ED?

- 1 Point What is the rationale for using D5W instead of local amide anesthetics?
- 1 Point What volume of D5W has been described as effective at treating radicular sciatic pain in the ED?
- 1 Point Identify the sciatic nerve from a transgluteal approach and any key anatomic landmarks
- 1 Point Complete this station within 10 minutes



You are hungry after an exciting weekend volunteering at Detroit’s Rouge Park with the Detroit Inspiring Connections Outdoors youth camping initiative (*if you want to get involved more information here <https://www.sierraclub.org/michigan/detroit-ico>*), so you stop in to local eatery Leo’s Coney Island for breakfast.

True story: You hear screaming coming from the bathroom. Someone yells “she’s giving birth right now!” and asks if there’s a doctor in the restaurant.



<https://www.metrotimes.com/arts/detroits-only-campground-to-reopen-after-more-than-a-decade-9538088>



<https://www.newsweek.com/waitress-didnt-know-pregnant-gave-birth-work-1478028>

Precipitous delivery is an uncommon - but terrifying - aspect of emergency medicine. Numerous case reports describe the challenges of precipitous delivery, including shoulder dystocia, multiple gestation, psychiatric delusions of pregnancy, nuchal cords, trauma, and even cases requiring out-of-hospital resuscitative hysterotomy (perimortem c-section).

In the setting of precipitous delivery, **lack of information about the gestation is a major barrier**. Point of care ultrasound can help! One method is “if you’re not certain, put a probe on the belly”¹. Another is the “LABUR protocol”². Accurate information can make all the difference!



References to let gestate en route to this station:

1. Press, Greg. *Resuscitative Hysterotomy in the Emergency Department*. Emergency Medicine Updates, 2013. <https://emupdates.com/pmcs/>
2. Bernardoni, B. *The LABUR Protocol: Ultrasound of the Month*. Taming of the SRU, 2019. <https://www.tamingthesru.com/blog/ultrasound/case-of-the-month-march-19>



3. Borhart J and Voss K. *Precipitous Labor and Emergency Department Delivery*. Emergency Medicine Clinics of North America Journal, 2019.
4. Brun, P et al. Ultrasound to perimortem caesarian delivery in prehospital settings. *Injury*, 2012.

Station 9: Parturition Station



- 1 Point Navigate to this location and complete within 10 minutes
- 1 Point Your patient is in active labor. What are the components of the LABUR protocol that you can employ to quickly evaluate both mother and fetus in preparation for precipitous delivery? (must identify at least 4 things)
- 1 Point You identify the fetal head is superiorly located in the uterus and contractions have begun. How is a breech presentation managed differently than a normal delivery?
- 1 Point Name three maneuvers that can be performed for shoulder dystocia.
- 1 Point [Redacted]
- 1 Point When should an emergency physician consider clamping + cutting a nuchal cord?
- 1 Point Utilize the LABUR protocol to identify on the phantom if there is a singleton or multiple gestational pregnancy. You only get the point for the exact correct number.
- 1 Point [Redacted]
- 1 Point A new reportedly pregnant patient arrives and begins to code! EMS reports “patient is 7 months along” but you are not sure if that’s reliable. How can you tell via palpation if they are far enough along to warrant attempting resuscitative hysterotomy (formerly known as perimortem c-section)?

If you can’t tell, how can a *one-second POCUS* scan help?
- 1 Point Pick a teammate and, as a team, guess how long an incision in cm you would have to make on them to adequately perform a resuscitative hysterotomy. (Must be within 3cm of measured distance to get a point)

 Estimated incision length: ____ cm
 Measured incision length: ____ cm



“Challenge Coins”, and The Belle Isle Casino

The Belle Isle *Casino* has never been a gambling establishment. The word comes from the Italian "casa", meaning house or public room, and that is exactly what this building has always been.

The first “casino” on Belle Isle was a wooden Victorian structure built in June 1887, one of the earliest buildings constructed after the island became a park. The current building replaced it in May 1908.



For generations, the casino was **Detroit's Grand Gathering Place** and hosted weddings, receptions, and public gatherings. It closed in 2023 for comprehensive restoration. The Belle Isle Casino reopened **on March 13, 2026. That date is 313 Day** in Detroit, named for the city's area code, and it was a fitting moment to return one of Belle Isle's most storied buildings to the community.

What is a Challenge Coin?

A *challenge coin* is a small metal medallion carried or displayed as a symbol of shared experience, earned respect, or notable accomplishment. Traditionally, coins are presented by leaders, peers, or organizations to recognize meaningful contributions, successful missions, completion of specialized training, acts of leadership, or special achievements.



Challenge coins originated in military culture, with modern traditions tracing back to World War I. Over time, the tradition spread into law enforcement, fire services, and eventually healthcare; particularly emergency medicine, where the specialty's strong ties to teamwork, high-stakes operations, and public service closely mirror military and first responder culture. Today, challenge coins are increasingly used to commemorate training or honor exceptional performance.

In emergency medicine and EMS, receiving a challenge coin often represents more than a souvenir; it reflects inclusion in a close professional community built around resilience, service, education, and performance under pressure.

Sources:

1. The Perna Team <https://www.thepernateam.com/blog/belle-isle-park-detroit/>, accessed 2026
2. Historic Detroit.org <https://historicdetroit.org/buildings/belle-isle-casino-old>, accessed 2026



References to review en route to this station

7. Pandurangadu A, et al. *Ultrasound-guided intravenous catheter survival impacted by amount of catheter residing in the vein*. Emergency Medicine Journal, 2018.
<https://pubmed.ncbi.nlm.nih.gov/30021833/>
8. WikiEM, Ultrasound-assisted Peripheral Line Placement. Accessed 2026.
https://wikem.org/wiki/Ultrasound-assisted_peripheral_line_placement
9. Bahl, A et al. *Ultralong Versus Standard Long Peripheral Intravenous Catheters: A Randomized Controlled Trial of Ultrasonographically Guided Catheter Survival*. Ann Emerg Med, 2020.
10. Ultrasound Guided Vascular Access: Clinical Reference. *The Clinical Database Blog*. Accessed online 2026. <https://blog.intracav.ai/vascular-access/guides/ultrasound-guided-vascular-access/>
11. Intravenous Access – Peripheral. *Clinical Practice Guidelines*. Royal Children’s Hospital Melbourne. Accessed 2026
https://www.rch.org.au/clinicalguide/guideline_index/intravenous_access_peripheral/

Station 10: Vascular Cannulation Station



Even though the Historic Belle Isle Casino was never used for gambling, today is your chance to test your luck (and skill) against your choice of faculty when it comes to placing an Ultrasound Guided Peripheral IV. May the odds be ever in your favor.

1 Point Pick a champion from your team to go up against a faculty member in a head-to-head race to place the fastest Ultrasound Guided Peripheral IV catheter.

[Redacted answer area]

2 Points *Guessed it perfectly*

1 Point *Guessed it +/- one decile (if the answer was 50%, a guess of 40 or 60)*

0 Points *Guess off by 2 deciles or more (if the answer was 50%, a guess of 30 or 70)*

1 Point According to Pandurangadu et al. (*Emergency Medicine Journal 2018*), what **percent** of the catheter must reside in the vein in order to still be a successful IV at 72 hours?

1 Point According to Bahl et al (*Annals of Emergency Medicine 2020*), what **length** of catheter inside the vein is associated with optimum outcomes?

1 Point We didn't come up with the 3:1:3 rule, WikiEM did. But this is Detroit so lets talk about it. What is the 3:1:3 rule for prescanning and picking the best target vein?

1 Point [Redacted answer area]

Station 10: Vascular Cannulation Station



- 1 Point Why should one *avoid* using the Brachial vein for peripheral IV access?
- 1 Point Lower extremity USGPV's are generally avoided due to higher rates of infection and thrombosis and should only be considered as a last resort. However, if you must, the great saphenous vein at the ankle is recommended in pediatric literature in particular as a reliable option⁵. For one point, identify this vein on a teammate and assess whether it fits the 3:1:3 rule in less than 60 seconds

- 1 Point REMATCH! Pick a champion from your team to go up against a faculty member in a head-to-head race to place the best Ultrasound Guided Peripheral IV catheter.

If you beat the faculty, you get not only a point for your team, but your champion gets the honor of a specially minted SonoWAR Challenge Coin to recognize your skill. (Additional teammate Champions are welcome to challenge faculty after your team is done)

Thank you to all of our faculty and sponsors!



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